

Cosmic Trails 2™

Eastern Caribbean, March 6th – 13th, 2011



www.InSightCruises.com/Sky-2

Expand your horizons, enrich your practice of astronomy, and relax with friends and kindred spirits. Join *Sky & Telescope* on the Cosmic Trails 2 cruise conference on Holland America's Nieuw Amsterdam, March 6–13, 2011. Expert knowledge, lush islands, recreation, and reflection await you.

Cosmic Trails balances the complexity and intricacy of modern astronomy with the simplicity of cruise travel. Get the big picture on the search for solar systems and planets with Dr. Alan Boss. Take a practical look at the instruments and photographic tools and techniques that can boost your observing productivity and enjoyment with Alan Dyer. Draw more information from celestial bodies right before your eyes with Captain Steve Miller's primer on celestial navigation. Visit the unseen world of radio astronomy

and the future of superscopes with Ivan Semeniuk. Get an account of Mount Wilson's epic activities and learn about the contributions of small telescopes in astronomy today with Dr. Hal McAlister.

And then, recharge your batteries in port, with kayaking, a chilled-out bistro lunch, or a great day at the beach. Go on an optional jaunt to Arecibo Observatory — glimpse the Gregorian dome and go behind and *under* the scene.

Sail with *Sky & Telescope* and indulge your thirst for knowledge. Have quiet time with a friend; enjoy fun and camaraderie with fellow astronomers; take your astronomy skills and knowledge up a notch. Visit www.InSightCruises.com or call Neil or Theresa at 650-787-5665 to get all the details, and then enrich your astronomy routine with an intellectual adventure with the *Sky & Telescope* community.

Cruise prices start at \$899, per person, for an Inside Stateroom. For those attending our seminars, there is a \$1,375 fee. Taxes and fees are \$129 per person.

For more info contact Neil at 650-787-5665 or neil@InSightCruises.com



Small Telescopes in the 21st Century

Speaker: Hal McAlister, Ph.D.

Astronomers now tag optical telescopes with apertures of 4 meters and below as "small" telescopes, and the trend is to design and build super telescopes with apertures of 30 meters or even larger. So, do "small" telescopes still have a role? We'll look at that question by exploring issues like scientific productivity, ease of access, cost of operation, developing new instrumentation, and student training. Dr. McAlister will highlight examples of innovative new ways of using small telescopes and their impact on astronomy.

The Power and Progress of Radio Astronomy

Speaker: Ivan Semeniuk

Near Arecibo, Puerto Rico, the world's largest dish antenna points skyward and tunes us into the radio universe. Whether it involves probing the nearest asteroids or spotting the most distant galaxies, radio astronomy has created a crucial window into the cosmos — and it remains our most likely channel for contact with other civilizations. Join Ivan and find out how radio astronomy is moving to the next level at Arecibo and new facilities around the world. Discover a universe that is forever unseen by human eyes.

CST# 2065380-40

OBSERVING THE SKY

A Second Century for Mount Wilson Observatory

Speaker: Hal McAlister, Ph.D.

With its 60- and 100-inch night-time telescopes and 60- and 150-ft solar tower telescopes, Mount Wilson Observatory (MWO) reinvented astronomy and gave birth to "astrophysics" early in the 20th century. While MWO is most certainly a world heritage science site, it is by no means an astronomical relic. Its excellent seeing conditions, enabled by stable air off the cold Pacific Ocean, make the site a great location for modern work emphasizing high resolution of stars by night and the sun by day. Join Dr. McAlister on a virtual insider's tour of MWO facilities and learn all about plans for "America's Observatory."

Choosing and Using a Telescope

Speaker: Alan Dyer

Thinking of buying a new telescope? Alan walks us through the marketplace of hundreds of telescopes, suggesting what to look for to ensure you get a great telescope you'll use a lot! Or... are you perplexed by the telescope you already own? Alan dispels myths and misconceptions many telescope owners still hold, and reviews tips and techniques all telescope owners should know.

Superscopes: The Future of Cosmic Exploration

Speaker: Ivan Semeniuk

More than four centuries since Galileo first turned a telescope to the heavens, the primary tool of astronomers is continuing to evolve and grow. Plans are underway for giant mountaintop observatories, like the Thirty Meter Telescope (TMT), that will usher in a new era of astronomical discovery. From the light of the first stars to the search for life on other worlds, we'll explore the scientific questions that are driving the next generation of big telescopes, and generations to come.



NASA's KENNEDY SPACE CENTER: AN INSIDER'S VIEW

NASA's launch headquarters, on the Space Coast, is the only place on Earth where you can tour launch areas, meet a veteran astronaut, and grasp the true enormity of the Space Program. Experience fun and wonder with Cosmic Trail companions in this private pre-cruise, custom, full-day tour. Get ready to walk among and beneath giant rockets, discover what it takes to launch the Space Shuttle from preparation to liftoff, and soak in Kennedy Space Center's "The Right Stuff" vibe.

We'll have an intense day with our expert guides, integrating the touchstones and experiences every visitor wants with behind-the-scenes sites seldom accessible to the public. The LC 39 Observation

Gantry, International Space Station Center, Apollo/Saturn V Center, and Astronaut Hall of Fame are on the agenda. We will not only view but visit the Vehicle Assembly Building, the shuttle landing strip, and the 6-million-pound crawler that transports the shuttle. Do lunch with an astronaut, view IMAX films with footage shot during NASA missions, and enjoy the products of mankind's inspiration.

The Kennedy Space Center excursion is \$225; it includes all of the above plus dinner, and transportation from the Kennedy Space Center to our pre-cruise hotel in Ft. Lauderdale. For details/questions, please contact Neil or Theresa, or give us a call at (650) 787-5667.



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WITHIN OUR SOLAR SYSTEM

The Formation of Our Solar System

Speaker: Alan Boss, Ph.D.

Discoveries have confirmed long-held suspicions that a supernova or other energetic stellar wind may have directly triggered the formation of our solar system. The Sun appears to have been born in a region where many stars were forming, many of them massive enough to explode as supernovae. Given that most stars are thought to form in similar environments, the fact that our solar system supports life implies that similar planetary systems, and hence life, may be commonplace in the galaxy.

New Voyages to Mercury, Mars, and the Asteroid Belt

Speaker: Ivan Semeniuk

2011 will be a banner year for the exploration of the inner solar system, including the first missions to orbit Mercury and the first encounter with a major asteroid (Vesta). It will also bring the launch of NASA's Mars Science Laboratory, the most ambitious robotic lander ever. Upcoming missions will answer key questions that address our emerging picture of rocky planets, including their origins, diverse histories and role in fostering the emergence of life. Ivan will review the science behind these missions and bring you up to date on the reconnaissance of our neighboring worlds.

BEYOND OUR SOLAR SYSTEM

The Search for Living Planets

Speaker: Alan Boss, Ph.D.

What are the chances that life exists elsewhere in the universe? The expectation is that most sun-like stars will harbor habitable worlds, and that life will be commonplace in our galaxy, and throughout the universe as well. NASA's Kepler Mission will determine the frequency of Earth-like planets by 2013. NASA will build other space telescopes that will discover the Earth-like planets closest to our Solar System, and characterize their atmospheres. The detection of biomarkers may allow us to determine whether these worlds are not only habitable, but perhaps even inhabited.

A Journey to the Center of the Milky Way

Speaker: Ivan Semeniuk

The greatest attraction of the tropical sky is not a single star or constellation but the view it affords of the center of the Milky Way. Shrouded in interstellar dust, the exotic environment at our galaxy's hidden core is only now being revealed with the power of space-based astronomy. This session puts Caribbean stargazing in perspective with a cutting-edge trip to the galactic center, where astronomers are hunting for dark matter, tracking the flight of hypervelocity stars, and peering over the event horizon of a super-massive black hole.

Twenty Five Years of Seeing Double

Speaker: Hal McAllister, Ph.D.

Speckle interferometry, discovered by Antoine Labeyrie in the early 1970s, is the simplest means for coping with atmospheric blurring and reaching the full diffraction limit of a telescope. Speckle interferometry has now replaced visual micrometry as the standard means for observing "visual" binaries. Hal earned his spurs as an astronomer tailoring the method to accurately measuring binary stars. He will describe the method and take you on a visit to some of his old friends among the double stars.

Zooming in on the Stars

Speaker: Hal McAllister, Ph.D.

Stars are so distant that only a handful of supergiants are within the resolution limit ideally obtained by large telescopes. The only way of measuring the sizes of normal stars and to resolve the tightest binary star systems is to observe them with multiple telescope, long-baseline interferometers. The premier instrument of this type for stellar astronomy at present is the CHARA Array, an array of six 1-meter telescopes laid out on the grounds of Mount Wilson Observatory. We'll follow the paths of photons traveling through an interferometer, where they encounter dozens of mirrors, filters, and optical windows before they combine and do their high resolution magic. Join Hal McAllister for a look at the unique contributions long-baseline interferometry is making to our knowledge of stellar properties.

SHOOTING THE SKY

Choosing and Using a DSLR Camera

Speaker: Alan Dyer

Digital single lens reflex (DSLR) cameras have revolutionized astrophotography, providing powerful cameras the rest of us can actually afford and use. In a three-part workshop Alan takes us through all the steps for taking great photos suitable for publication in Sky and Telescope! In this session Alan reviews what to look for in a DSLR camera for astrophotography. Once you have a camera, you're ready to take publication-quality photos with no more than surprisingly simple techniques. Alan presents his suggestions for shooting great nightscapes and stunning time-lapse sky movies.

Tips and Techniques at the Telescope

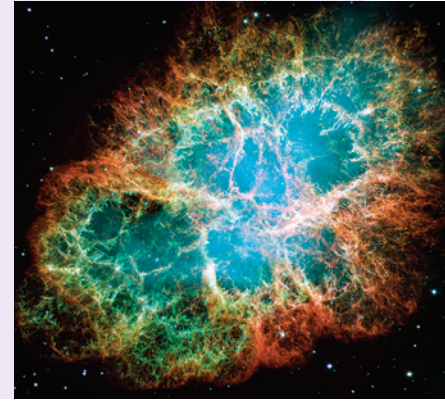
Speaker: Alan Dyer

Hook a camera to a telescope and you have a powerful combo for taking long exposures of deep-sky targets. Alan gives you recommendations for camera settings for maximum performance, how to find and focus targets, and whether to guide or "track-and-stack" short exposures.

Processing Images, the Finishing Touch

Speaker: Alan Dyer

In making a great deep-sky photo, the secret of success is in the image processing. Alan will step us through his "workflow," from file transfer from the camera to final publication-grade photo. The workflow stays entirely within the Adobe Photoshop family of programs, including Adobe Camera Raw. By taking a set of images "from RAW... to remarkable" Alan demonstrates the wonderful but little-known tools Adobe Photoshop offers for astronomers.



CELESTIAL NAVIGATION

Introduction to this series of six classes: This hands-on, six-hour class (three of which are described here) is about determining your exact position on Earth — using the celestial bodies visible in the sky as your references. This seminar will cover the tools used for celestial navigation, primarily the sextant and an accurate timepiece. The coordinate system of both the Earth and the sky will be explained as will the relationship between longitude and time. The navigator's traditional Noon Sight will be discussed and the procedures will be explained and demonstrated.

The Tools Used in Celestial Navigation

Speaker: Steve Miller

In this session the tools used in celestial navigation will be discussed. There will be a hands-on exercise with the sextant in the classroom and in a later session it will be used to do an actual sight of the Sun. The Nautical Almanac will be introduced and the pertinent information that is required for the sight will be revealed.

The Basics of Latitude and Longitude

Speaker: Steve Miller

This session will cover the basics of latitude and longitude on Earth and the coordinate system used in the sky. For the Sun, in our discussions, we will discuss the declination (latitude) and the Greenwich Hour Angle (Longitude) and their relationship to the latitude and longitude on Earth. The attendees will get an understanding of the basic relationship of the coordinate systems on Earth and the sky along with the importance of time.

The Two Types of Navigator's Sights

Speaker: Steve Miller

We will learn about the two types of Sights that we will be doing our cruise, the Noon Sight, and a Polaris Sight. The Noon Sight actually takes place at a specific time of the day determined by the rotation of the Earth around its axis. We will learn how to determine the Noon Sight time and what we do with the information after our Sight. The Polaris Sight can be done before sunrise or after sunset and we will learn how to determine exactly when you can "shoot" Polaris.

ARECIBO OBSERVATORY: A BEHIND-THE-SCENES TOUR

Explore the contributions and potential of radio astronomy at the celebrated Arecibo Observatory. Get an unparalleled behind-the-scenes tour of the iconic facility, and absorb an in-depth look at the unique contributions derived from Arecibo research and development.

Join us as we wind through the rainforest-blanketed karst terrain of Northern Puerto Rico. We'll get a sense of the massive physical scope of the Arecibo radio telescope. We'll boldly go where ordinary visitors are not permitted. NAIC scientists will update us about the radio astronomy, planetary radar discoveries, and climatology research at the observatory. From the monitoring of near-earth

objects to cosmology, astrophysics, and global warming research, you'll gain insight into the vital activities at Arecibo.

Optional eight-hour tour includes transportation, entrance fees, and a private luncheon at the Arecibo Observatory (\$175).

Transmission of the Arecibo message to star cluster M13 in 1974 marked the remodeling of the telescope we'll be visiting. The 73-row-by-23-column message depicts numbers, aspects of DNA, graphic depictions of humans, the solar system, and the Arecibo telescope.



Photograph Courtesy of the NAIC-Arecibo Observatory, a facility of the NSF

